STREAM CROSSING

(No.)

Code 578

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

A stabilized area or structure constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles.

II. Purpose

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream.
- reduce streambank and streambed erosion.
- provide crossing for access to another land unit.

III. Conditions Where Practice Applies

This practice applies to all land uses where an intermittent or perennial watercourse exists and a ford, bridge, or culvert type crossing is desired for livestock, people, and /or equipment.

IV. Federal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, state and local laws, rules, regulations or permit requirements governing stream crossings. This standard does not contain the text of federal, state, or local laws.

V. Criteria

A. General Criteria

1. Location

   Stream crossings shall be located in areas where the streambed is stable or where grade control can be provided to create a stable condition. Avoid sites where channel grade or alignment changes abruptly, excessive seepage or instability is evident, overfalls exist, or large tributaries enter the stream.

   Wetland areas shall be avoided if at all possible.

   Locate crossings, where possible, out of shady riparian areas to discourage cattle loafing time in the stream.

   Bridges, culverts, and channel fords shall be installed to not significantly impact fish migration.

   All channel fords shall be constructed in a manner which does not obstruct water flows.

2. Access Roads

   Where the stream crossing is installed as part of a roadway, the roadway shall be in accordance with Wisconsin NRCS Field Office Technical Guide (FOTG), Section IV, Standard, 560, Access Road.

3. Stream Approaches

   Crossings should be aligned perpendicular to the channel to the extent possible.

   Ramps for livestock channel fords shall not be steeper than 4 horizontal to 1 vertical (4:1). Ramps for equipment shall be 7 horizontal to 1 vertical (7:1) or flatter.

   Surface runoff shall be diverted around the approaches to prevent erosion of the approaches. Roadside ditches shall be directed into a diversion or away from the crossing surface.

4. Width

   The stream crossing shall provide an adequate travel-way width for the intended use. A multi-use stream crossing shall have a travel-way no less than 10 feet

[1]Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

wide. "Livestock only" crossings shall be no less than 4 feet wide.

5. Side Slopes

   Side slopes for all cuts and fills shall not be steeper than 2 horizontal to 1 vertical (2:1).

6. Fencing

   Areas adjacent to the stream crossing shall be permanently fenced or otherwise excluded as needed to manage livestock access to the crossing.

   Cross-stream fencing at fords shall be accomplished with breakaway wire, swinging floodgates, hanging electrified chain or other devices to allow the passage of floodwater debris during high flows.

   All fencing shall be designed and constructed in accordance with Wisconsin FOTG, Section IV, Standard 382, Fence.

7. Vegetation

   All areas to be vegetated shall be planted as soon as practical after construction. When necessary, use of Wisconsin FOTG, Section IV, Standard 342, Critical Area Planting shall be considered where vegetation is unlikely to become established by natural regeneration, or acceleration of the recovery of vegetation is desired.

8. Specific Criteria for Channel Crossings

   Crossings are installed to provide access for equipment and/or livestock across or over drainage ways.

   The crossings options are:

   - Bridges or culverts.
   - Stone surfaced fords consisting of *graded rock* base course and a stone surfacing treatment.
   - Paved surfaced fords consisting of paved surfaces, including pre-cast concrete panels or beams, placed on the channel bottom and sides.

a. Bridges or Culverts

   Bridges and culverts must meet the requirements for capacity as required by state statutes or local ordinances. Table 1 shall be used when no statutory or ordinance requirements exist.

   On public roads, the minimum design storm runoff capacity shall be conveyed without causing erosion or road overtopping.

   On non-public use roads, an erosion-resistant low point or overflow area may be constructed across the road to supplement the capacity. Flow depths and velocities must allow safe passage of private and emergency vehicles.

Table 1

Access Road Type	Storm Frequency (24-hour duration)
Forest, Farm Field	2-year
Farm Driveways, Non-Public	10-year
Public	25-year

b. Stone Surfaced Fords

   Laboratory soundness tests are not required for rock used in channel fords. The rock must appear to be sound when inspected. Weakly cemented rock materials are not allowed.

   Base course material shall be stable for design velocities computed for the 10-year, 24-hour duration storm or channel full flow, whichever is less.

   Crushed stone surfaces shall be stable for design velocities computed for the 10-year, 24-hour duration storm or channel full flow, whichever is less, unless provisions for replacement are

included in the Operation and Maintenance Plan.

Allowable velocities for various sizes of rock material are shown in Table 2.

Table 2

D_{50} (inches)	Velocity (fps)
0.5	2.7
1	3.2
2	4.3
3	5
4	5.6
5	6
6	6.5
7	7.2
10	8

Base course options include quarry-run (angular) or field stone (rounded) graded rock. (see Table 3).

Table 3

Foundation Consistency and Use	**Minimum Base Course Thickness**
Soft foundations for Equipment crossings	18 inches or 8 inches underlain with geotextile.
Firm foundations for Equipment crossings and ALL cattle crossings	8 inches

Geotextiles shall meet the requirements of Table I or II, Class IV, contained in Wisconsin NRCS, FOTG, Section IV, Construction Specification 13, Geotextiles.

Surfacing treatment options include either:

1) 4 inches of crushed stone.

2) 4 inches of additional base course thickness.

If a 2-inch thick hoof contact zone is used, the thickness of the stone surface layer may be reduced by 2 inches. The material to be used for hoof contact will be decided upon by the landowner and could include sand, ground limestone, rock screenings, or similar materials.

c. Paved Surfaced Fords

Concrete fords shall be placed on a base of 6 inches of pit run sand-gravel.

Steel reinforcement is required for soft foundations.

Poured concrete surfacing shall be roughened or grooved to provide traction.

Poured concrete 5 inches thick or precast concrete panels may be used.

VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows.

A. Avoid or minimize stream crossings, when possible, through evaluation of alternative trail or travel-way locations.

B. Ford crossings have the least detrimental impact on water quality when crossing is infrequent. Ford crossings are adapted for crossing wide, shallow watercourses with firm streambeds.

C. Stream crossings should be located where adverse environmental impacts will be minimized and considering the following.

- Effects on up-stream and down-stream flow conditions that could result in increases in erosion, deposition, or flooding.
- Short term and construction-related effects on water quality.
- Effects on fish passage and wildlife habitats.
- Effects on cultural resources.
- Overall effect on erosion and sedimentation that will be caused by the installation of the crossing and any necessary stream diversion.

D. Where stream crossings are used, evaluate the need for safety measures such as guardrails at culvert or bridge crossing, or water depth signage at ford crossings.

E. Access road surface treatment for weak-bearing capacity soils should be underlain by a geotextile to minimize required maintenance.

VII. Plans and Specifications

Plans and specifications for stream crossings shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

VIII. Operation and Maintenance

An operation and maintenance plan shall be developed and implemented for the life of the practice.

The stream crossing, appurtenances, and associated fence should be inspected after each major storm event, with repairs made as needed.

Periodic replacement of livestock hoof contact material in channel crossings due to livestock travel or erosion by runoff events.

IX. References

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.

Wisconsin's Forestry Best Management Practices for Water Quality, Wisconsin Department of Natural Resources, Bureau of Forestry.

X. Definitions

Crushed stone (V.A.8.b.) - 100% passing ¾ inch sieve and 10% maximum passing the #200 sieve.

Graded rock (V.A.8.) - 100% passing the base course thickness dimension and a maximum of 10% passing the ¾ inch sieve. All sizes between the limits shown on the drawings are to be represented.